Mineralized Synthetic Matrices as an Instructive Microenvironment for Osteogenic Differentiation of Human Mesenchymal Stem Cells.

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Public Summary:
This study describes the development of a biomimetic material that can promote bone tissue formation.

Scientific Abstract:
The effect of substrate-mediated signals on osteogenic differentiation of hMSCs is studied using a synthetic bone-like material comprising both organic and inorganic components that supports adhesion, spreading, and proliferation of hMSCs. hMSCs undergo osteogenic differentiation even in the absence of osteogenesis-inducing supplements. They exhibit higher expressions of Runx2, BSP, and OCN compared to their matrix-rigidity-matched, non-mineralized hydrogel counterparts. The mineralized-hydrogel-assisted osteogenic differentiation of hMSCs could be attributed to their exposure to high local concentrations of calcium and phosphate ions in conjunction with chemical and topological cues arising from the hydrogel-bound calcium phosphate mineral layer.